

**PACKAGED CONFECTIONERY COMBINATION INCLUDING  
CONFECTIONERY PIECES PACKED IN-GROUP AND METHOD  
FOR PRODUCING SUCH A COMBINATION**

5     Cross-Reference to Related Applications

        This application is a continuation of International application PCT/EP01/14632 filed December 7, 2001, the entire content of which is expressly incorporated herein by reference thereto.

10    Background Art

        The present invention relates to a novel combination of confectionery pieces and a packaging adapted therefore that prevents scuffing of the confectionery pieces and improves the convenience for the consumer. The invention also relates to a method for producing a combination comprising confectionery pieces and a  
15    packaging.

        Small items of confectionery such as chocolates are usually packed in "vacuum thermoformed" or cardboard trays to protect them and, more particularly, to prevent their surfaces from scuffing. However, the packaging of such products makes the presentation and display elaborate and it is not convenient to snack them when on  
20    the go. The same confectionery items might be found in bags but they lose their gloss very quickly due to the effect of scuffing which takes place in the bag prior to opening. In order to reduce scuffing, a resistant coating could be applied around the confectionery pieces so that they become more resistant. This solution requires an additional production stage and may possibly affect the taste and/or texture of the  
25    product. Another solution includes individually wrapping the confectionery pieces with a foil or film before filling them into the bags by vertical form-fill-seal machines. However, the individual packaging is costly and requires an additional packing stage. Furthermore, the consumption is not very convenient for the consumer who has to unwrap the confectionery piece.

30          On the contrary, chocolate bars packed in flow-wrap packages, also called "pillow pack", are more attractive chocolate products for eating on the go. One of the most successful chocolate snacks is the famous KitKat<sup>®</sup> bar product which is an elongated angular molded chocolate bar, with wafers inside, longitudinally scored along at least one partition line that can make the bar portionable. A flow wrap  
35    package surrounds the bar to protect it and to keep its nice glossy appearance.

It would be desirable to propose alternative formats of such a confectionery product having the same standard of quality and appearance but which would further offer a high degree of convenience and easy nibbling or snacking of the product.

To date, there does not exist a confectionery product having an angular  
5 configuration that can be nibbled in a bag but that retains its gloss and its shape integrity while stored and transported. There exists round pieces of chocolate with a biscuit inside packed in flow wrap bag such as the Maltesers<sup>®</sup> chocolates from Mars that can be nibbled without the need to be portioned, but these products are less subjected to scuffing because of their intrinsic shape. i.e., they have no sharp edges,  
10 and they are also usually covered by a protective coating or glaze that increases their resistance to scuffing when they are in the bag.

EP 0 109 353 relates to a package containing at least one row of disk-shaped objects, especially biscuits, adjoining each other on their flat sides. According to this method, the objects counted and grouped for packaging are raised parallel to their flat  
15 sides into an input station, pushed together with a portion of wrapping sheet at right angles to their flat sides into an intermediate station in which a longitudinal seam is sealed and two transverse seams are sealed such that roots of all the seams lie in a common plane. However, due to the very tight product arrangement in the pack, such a combination of pack and food product does not provide a satisfactory solution for  
20 nibbling of the products in the pack once the pack is opened.

FR 850.597 relates to a rectangular envelope-type packaging for goods especially adapted for receiving a high number of goods. However, it does not provide, as such, a solution to avoid scuffing of sensitive food items, in particular items of angular format, as well as convenience for consuming the food items.  
25 Therefore, it would be desirable to propose a solution for providing a novel angular format of confectionery snacks that does not scuff when stored in the pack but which would provide easy nibbling to the consumer in a very attractive and user-friendly manner. It would also be desirable to have a solution that is inexpensive and does not affect the taste of the product, i.e., does not require an additional coating step of the  
30 food product and requires minimal quantities of packaging material and, furthermore, looks attractive for the consumer. The present invention now satisfies that need.

## Summary of the Invention

The invention relates to a packaged confectionery combination which comprises a closed flexible package member surrounding a confectionery product that includes a plurality of individual confectionery pieces, each having a glossy appearance and being packed in a matrix configuration within the package member. The matrix configuration extends in at least two directions within the package member so as to form at least one layer of at least two rows in each direction, with each row including a series of individual confectionery pieces. The package member is tight enough around the confectionery pieces so as to maintain the integrity and shape of the matrix configuration when the package member is closed in order to maintain the glossy appearance and to avoid scuffing of the pieces prior to opening the package member. When the package member is opened, the pieces move out of the matrix configuration to facilitate nibbling of individual pieces from the package member.

Preferably, the confectionery pieces are arranged so that there is at least a clearance left between the confectionery pieces effective to enable confectionery pieces to collapse in the available volume of the package member so as to promote convenient nibbling. Such a clearance contributes to the collapsing of the confectionery pieces when tension of the package member around the confectionery product is released during opening of the package member. The clearance prevents the pieces from remaining stacked onto one another after the opening of the package member. The clearance also ensures there is room available in the package member to accommodate random rearrangement of the pieces in the package member after they collapsed. Preferably, the confectionery pieces may be touching along a first side portion and be distant along another side portion. Whereas the touching portion favors the row arrangement when the package member is closed, the transition between the portions promotes tilting and collapsing of the rows of confectionery pieces when the package member is opened.

As a result of such a construction, the confectionery pieces are organized in such a manner that they are available for nibbling by the consumer while the frictions and other mechanical interactions between the pieces are kept minimal during storage in the tensioned pack thereby successfully reducing scuffing in the pack.

The invention also relates to a method for providing a confectionery product in the form of confectionery pieces in a package member that reduces scuffing of the pieces and promotes nibbling of the confectionery pieces. This method comprises providing a plurality of individual confectionery pieces, each having a glossy appearance and being present in a matrix configuration that extends in at least two directions within the package member so as to form at least one layer of at least two rows in each direction, with each row including a series of individual confectionery pieces, and flow wrapping the matrix configuration of confectionery pieces to form a package member that is adapted in tension and size to be sufficiently tight around the pieces to retain the matrix configuration in order to maintain the glossy appearance of and avoid scuffing of the pieces when the package member is closed. Upon opening of the package member, the tension is released so that the pieces move out of the matrix configuration to facilitate nibbling of individual pieces from the package member.

The invention also provides a method for producing the combination of a flow wrap package member and a plurality of individual confectionery pieces using a horizontal flow wrap device.

## Brief Description of the Drawing Figures

The present invention will become more apparent from the drawing Figures that are described herein and annexed hereto, in which:

Fig. 1 is a perspective view of the combination of the invention showing the confectionery pieces organized in matrix in solid line and the package member surrounding the chocolate pieces in dotted line;

Fig 2 is another perspective view of the combination of Fig. 1 but with the confectionery pieces in dotted line and the package member in solid line;

Fig. 3 is a side view of the combination along direction indicated by arrow A in Fig. 2;

Fig. 4 is a cross-section view of the combination of Fig. 2 along line B-B;

Fig. 5 is a detail view of the opening means of the package member of Figs. 1 to 4;

Fig. 6 is a view showing the package member after opening and available for nibbling;

Fig. 7 is a perspective of a variant of the combination using another easy opening mode;

Fig. 8 is a perspective view of the variant of Fig. 7 after opening of the package member to form a configuration of sachet;

Fig. 9 is a cross section view of the embodiment of Fig. 7 along line C-C;

Fig. 10 illustrates a schematic cross section view of another embodiment with two superimposed layers of confectionery pieces;

Fig. 11 illustrates a schematic view of the production line adapted for producing the combination of the invention including a packaging stage and a subsequent breaking stage;

Fig. 12 illustrate a schematic top view of the wrapping station of the production line of Fig. 11;

Fig. 13 illustrates the breaking-up operation along the transversal direction of the product;

Fig. 14 illustrates the breaking-up operation longitudinal to the direction of the product;

Fig. 15 illustrates a perspective view of a packaged combination before breaking off in a multitude of individual pieces;

Fig. 16 illustrates a cross-section view of a variant of the combination of the invention;

Fig. 17 illustrates another variant of Fig. 16;

Fig. 18 illustrates another variant of Fig. 16.

#### Detailed Description of the Preferred Embodiments

The term "confectionery pieces" is used herein to refer to any type of relatively small size items formed partially or totally of chocolate or chocolate-like material or delicate confectionery material such as a tempered or non-tempered dark, white or milk chocolate, a compound coating or other fat base compound or chocolate substitute or marzipan or sugar including or not wafer(s), biscuit(s), cooked sugar, nuts or fruits or any other edible inclusions.

In this description, the term "tight arrangement" means a configuration where the confectionery pieces form with the flow wrap packaging a unit that is capable of retaining its organized matrix configuration by the effect of the tension and size of the flow wrap around the confectionery product and, a unit that is sufficiently resistant to disorder to prevent overlapping of one piece by another in normal situation of manipulation when the package member is closed. More particularly, the matrix configuration should be retained in situations such as when the package member is moved from an horizontal position to a vertical position and vice versa or when the package member is shaken by one extremity. Such situations are frequently met when the packages are transported, stored horizontally or vertically on shelves or manipulated by the consumer. The confectionery pieces should also normally resist rotation along their axis as resulting from the "tight" configuration. Conversely, the pieces should not be too tightly packed until to remove all gaps between the pieces to an extent that would cause the package member to deform and take a "banana" shape which would be regarded as a visual defect of the product.

In a preferred embodiment, the "tight arrangement" may obtained successfully by horizontally wrapping the confectionery product under a certain wrapping tension without leaving any significant head space. Horizontal wrapping possesses the advantage to produce gentle wrapping of the confectionery product without scuffing it while precise control of the tightness of the package member can be achieved. More precisely, control of the tightness may be achieved by controlling the dimensioning and tensioning of the package member web that surrounds the confectionery product, more especially, along its transversal axis, when forming the sleeve member that can

be precisely adjusted and sealed longitudinally without deforming the confectionery pieces.

The package member preferably forms a sleeve comprising two opposite web portions wrapping on the two main outer sides of the layer(s), with sleeve being sealed along a longitudinal seam. The sleeve member is further closed at the both ends of the layer(s) by transverse end seams. In a first embodiment, the sleeve forms two substantially rectangular opposite web portions folded on one longitudinal edge and having the three other edges forming sealing seams. In a second embodiment, the sleeve forms a substantially flattened tubular web with a longitudinal seam extending approximately centrally along one side of the sleeve and closed on both transverse edges by transverse end seams. In general, the web portions are maintained distant from each other around the outer of the confectionery layer(s), so that when the package member is positioned horizontally or vertically at rest, the distance  $d_0$  between the two web portions is lower than twice the height  $h_0$  of the layer(s). Again, the dimensions, as defined, have been found advantageous for limiting the interactions between the confectionery pieces in the package member while forming a bag which upon opening allows easy nibbling of the confectionery pieces.

Preferably, the confectionery pieces are housed in the interior of the flow wrap package member freely without additional support member such as a tray, a cardboard member and the like. Although such support could be used, it is not desired to have it, as it would stiffen the flow wrap package member after opening that could not conveniently allow the pieces to separate in the bag for nibbling of the confectionery pieces. Therefore, the package member would be less user-friendly and also more costly to produce. As one beneficial aspect of the invention, the combination of the flow wrap package member with the matrix configuration of the confectionery pieces being tightly packed enables the product to appear like a flow wrapped bar when the package member is closed and to behave like a confectionery bag for easily and conveniently nibbling the confectionery pieces when the package member is subsequently opened.

Additionally, the flow wrap package member comprises an opening portion with an opening means adapted to open the opening portion of the package member whereby opening of the opening means causes the tension of the package member

around the chocolate pieces to release and consequently, enable to the confectionery pieces to lose their matrix configuration and to become disordered in the package member. By opening of the package member as defined, the package member can easily be transformed upon opening into a pouch or bag where the confectionery pieces are easily and directly available for nibbling. In a preferred embodiment, the opening portion of the package member extends along one edge of the package, advantageously along the edge of the greater length of the package, so as to maximize the opening of the package member for making nibbling more convenient as in a bag. It is contemplated to aid opening of the opening portion according to a privileged opening direction by providing suitable opening means that enables both the release of tension and the formation of a bag configuration that is convenient for nibbling. For that, the opening means may preferably be arranged to open the opening portion along a privileged line such as a tear cut means, a zipper-type opening, a tear tape, perforation, laser perforation or combination(s) thereof.

The present invention also includes a method for providing a confectionery pieces in a package member that reduces scuffing of the pieces and promotes nibbling of the confectionery pieces. The confectionery pieces are preferably wrapped in a flow wrapped package member in a matrix configuration along at least two directions within the package member so as to form at least one layer of at least two rows, with each row consisting of a series of confectionery pieces and the rows being arranged in parallel together and wherein the package member is adapted in tension and size around the confectionery pieces to retain the matrix configuration when closed and, conversely, is adapted to release tension sufficiently upon opening to form an open bag for nibbling of the confectionery pieces.

The invention also relates to a method for producing a combination comprising a flow wrap package member and a plurality of individual confectionery pieces wrapped within the package member into a matrix configuration wherein it comprises providing a scored block of confectionery, wrapping the block into a flow wrap package member and breaking up the block within the flow wrap package.

This has been found to be beneficial to firstly wrap and subsequently break the confectionery products, as aforementioned, in order to predefine the arrangement of confectionery pieces in the wrap package, e.g., with minimal clearance therebetween,



while enabling wrapping without risking to disturb the final distribution desired. Furthermore, molding of the confectionery products made in blocks is cost efficient and facilitates mass production, while the superimposition of several layers in the package member is made easier with limited risks of misplacing the confectionery items.

Preferably, the wrapping of the block is carried out horizontally in an horizontal flow wrap device. Horizontal flow wrap device as opposed to vertical pillow wrap systems helps to wrap the confectionery block at high speed while controlling the size and tension of the package member material around the block.

Still in a preferred embodiment, the plurality of confectionery pieces, as a result, is wrapped as a tight assembly of pieces capable of retaining its shape assembly of separate abutting pieces after breaking.

The invention also relates to a method for producing a combination consisting of a flow wrap package member and a confectionery product wrapped within the package member. The confectionery product is wrapped horizontally using an horizontal flow wrap device. The confectionery product is wrapped while forming a sleeve member having at least one longitudinal seam. The confectionery product forms, after wrapping, an arrangement of a plurality of separate confectionery pieces of more than one row; each row comprising at least two confectionery pieces. The flow wrap is capable of maintaining the arrangement in place until first opening of the flow wrap.

The arrangement of confectionery pieces is retained in place, at least partly, by the control of the dimensions; i.e., the width, and tension of the sleeve member as determined by the sealing of the longitudinal seam provided in the flow wrap device. Also, the arrangement of confectionery pieces is wrapped while leaving a clearance between the confectionery pieces effective for the confectionery to collapse upon opening of the package member and to occupy a volume less than the total available volume of the opened package member.

A first embodiment of the invention is illustrated in Figs. 1 to 6. The combination comprises a plurality of individual chocolate pieces 10 that are organized in a layer of pieces according to a matrix configuration along at least a first direction

$D_1$  and a second direction  $D_2$  orthogonal to the first direction  $D_1$ . If one considers first direction  $D_1$  as a starting reference, the chocolates pieces are arranged in a series of rows 11, 12, 13 and 14 extending in parallel along  $D_1$ ; each row including an equal number of chocolate pieces 110, 111, 112, 113, therefore forming a quadrilateral  
5 block of separate, substantially contiguous pieces with gaps between them. Each piece forms a separate item in the package member in the sense that there is no specific connection between the pieces within the package member. One piece of chocolate may be found relatively loose with respect to another piece. However, the whole layer of chocolate pieces is sufficiently tightly packed to remain in order. The number of  
10 layers of the chocolate pieces is not a limiting factor. More than one layer may be provided in the package, therefore, extending the matrix in a third direction  $D_3$  orthogonal to plane  $D_1$ - $D_2$  as illustrated in Fig. 10 in which two layers 10a, 10b are superimposed.

According to one important aspect of the invention, the chocolate pieces are all  
15 maintained in the matrix configuration of separate elements in a relatively close arrangement by means of an outer flow wrap package member 2 which surrounds and holds intimately the elements in place. The chocolate pieces are preferably arranged in abutting engagement together in the package member while a limited gap should advantageously be provided. As illustrated in Fig. 4, it is preferred that there is a  
20 flared gap 29 formed between, at least, side portions 290 of confectionery pieces adjacent to one another. Side portions 290 of two adjacent pieces are arranged to form non-parallel surfaces. As a result, the confectionery pieces are more easily inclined to collapse upon opening of the package member as it will be later explained. The confectionery pieces may also have touching side portions 291 of adjacent  
25 confectionery pieces. The touching portions are flat parallel surfaces or lines that promote a more steady arrangement in the tensioned package member. The touching portions may not necessarily need to adjoin tightly each other but, depending upon the tension of the wrapping, may keep a somewhat loose touching relationship.

For instance, in a preferred design, each piece may preferably have an upper  
30 trapezoidal cross-section 292 in both directions  $D_1$  and  $D_2$  and, below a transition line 294, a lower rectangular 293 cross-section in the same directions. The lower rectangular section may extend to form outwardly protruding edges (not shown).

In a preferred embodiment, the package member 2 comprises two main web portions 20, 21 of a flexible wrapping material enveloping the layer 10 of separate chocolate pieces. The two web portions 20, 21 are preferably formed from a single sheet, film or web of material folded on a first edge 22 and sealed in a manner known  
5 in the packaging technology along the three remaining edges 23, 24 and 25 so as to provide a U-shaped sealing configuration with sealing seams, respectively, 26, 27 and 28. The side sealing seams 26 and 28 are orthogonally oriented with respect to the folded edge 22 to form pinch folds 26a, 28a at the intersection with the folded edge 22. At the intersection of the side seams 26, 28 and the longitudinal seam 27, the two  
10 web portions form, respectively, pinch folds 26b, 28b. The seam may be carried out by heat sealing or, alternatively cold sealing, as known in the art.

As illustrated by Fig. 4, the web or film is wrapped to intimately contact the upper and lower surfaces of the individual chocolate pieces so that a compact flow wrap packaging combination can be obtained that is substantially flat and relatively  
15 self-supporting without the need of inserting an additional support card or similar stiffening member. The film is controlled through the wrapping process to form intimate contact without the package member forming a bulge. For that, the wrapping is sized and tensioned by sealing along the edges sufficiently around the layer of chocolate pieces at a magnitude that prevents an easy overlapping of one chocolate  
20 piece by another. It has been found effective for this object to have the two web portions 20, 21 being distant one another, when the package member is at rest, by a distance  $d_0$  that is lower than twice the thickness  $h_0$  of the (overall) layer(s) of the chocolate pieces. However, given the flexibility of the package member material and the state of separation of the chocolate pieces within the package, the package  
25 member may be inevitably submitted to some deformation despite the sizing and tensioning that can be technically applied during wrapping. Therefore, it has been found also effective to dimension the package member around the product so as to maintain the maximal deformation of the package member as minimal as possible to minimize the risks of disorder in the package member before the package member is  
30 first opened.

As an example illustrated the embodiment of Fig. 4, if one considers the perimeter of the section of the layer of the confectionery pieces as being equal to

2(h<sub>0</sub> + l<sub>0</sub>), with l<sub>0</sub> being the width of the chocolate layer when the pieces are substantially in abutting arrangement together, an intimate contact can be achieved between the layer of confectionery product and the packaging sleeve by dimensioning the width "W" of the web necessary for wrapping the confectionery layer by the

5 formula :

$$W = 2(l_0 + l_1) + h_0(1 + \text{Racine}2) + \varepsilon,$$

with l<sub>1</sub> being the width of the longitudinal seam 27 and ε being a minimal tolerance dictated by the machine type and a certain safety margin for preventing deformation of the package member and the "banana effect" from occurring. The ε tolerance value

10 may vary depending on a number of factors but, for instance, it may range between 1 to 10% of the width "W". Also, depending on the type of flow wrap chosen, the width of the web may be theoretically calculated by a different formula. As for example, if one considers a flow wrap having a centrally positioned longitudinal seam on one of the main sides of the package, the ideal width "W" would be calculated by a formula:

15  $W = 2(l_0 + h_0 + l_1) + \varepsilon$ , with l<sub>1</sub> being the width of the longitudinal central seam. In a similar manner, the length of the flow wrap web with two end sealing seams may be in theory calculable by the formula:  $L = l + l_2 + l_3 + h_0 \text{Racine}2$ , where l is the longitudinal length of the confectionery product and, l<sub>2</sub> and l<sub>3</sub> represent the width of the end seams desired. Furthermore, if gussets on the edges are desired, the calculated  
20 dimensions of the web may also vary accordingly. In practice, the suitable sizing and tensioning to obtain the desired tightening around the product may be made by calculation and/or experimental iteration and machine tests.

The combination of the invention aims at providing the protection of a flow wrap package member for individual confectionery pieces having reduced risks of  
25 scuffing, with the convenience of a bag or pouch for consuming the chocolates on-the-go. Therefore, the package member 2 may further comprise an opening means that enables the chocolate pieces to be easily nibbled, as they would be in a regular pouch or bag. The opening of the package member should not be such that the chocolate pieces are all or, at least in a majority, released at the same time, thus, that would  
30 cause melting in the hands of the consumer. For that, it is preferred that an opening system is provided which guides or aids the opening of the package member and allows the package member to become a bag adapted for nibbling of the chocolate

pieces. Preferably, the opening system extends along one opening portion of a sufficient length. Even preferably, the opening portion extends over the greater length of the package member. The opening portion is preferably located close to a side of the package member thus leaving the package member open as a bag having three  
5 other closed sides. Preferably, the opening portion extends along or parallel a sealing seam of the package member. As an example, the opening is provided all along the longitudinal sealing seam 27. The opening system may be any suitable system already known in the flow-wrap packaging industry.

According to a preferred aspect, an opening system is preferably provided to  
10 open the bag along a predetermined elongated portion of the package member so that the package member is properly opened to form a bag easy for nibbling the pieces without damaging the content of the package member nor delivering too many pieces at a time. Advantageously, the opening system should be placed so that the package member can be opened along an edge of sufficient length, preferably, an edge of  
15 greater length as compared to the other edges. However, the opening system could also open along the edge of smaller length.

In a first embodiment, the opening system may comprise a reclosable seal such as a zipper strip 30 extending along a seam formed of a male and female interlocking arrangement illustrated in Fig. 5. As known 'per se', such a zipper strip is located  
20 internally and close to the inside of the package member with the seam 27 forming an airtight, durable, safety seal before the first opening. The zipper is usually formed from a strip that is heat or cold sealed or adhesively attached to the internal surfaces of the web portions during the packaging process. The zipper could also be replaced by any equivalent reclosable sealing systems such as a simple self-sealing label, for  
25 instance.

At the first time, the package member is opened by tearing or cutting across the safety seal 27 as illustrated in Fig. 6. As a result of the opening, the wrapping tension on the webs that surrounds the chocolate pieces is released sufficiently to cause the chocolate pieces to, at least partially, mix up in the package member that  
30 consequently becomes a bag in which nibbling is made particularly convenient. In particular, the clearance under the form of multiple gaps provided between the chocolate pieces confers a free volume that enables the pieces to rearrange in the total

volume of the pack. The flared configuration of the gaps further promotes collapsing when the package member is held open in a substantially vertical position therefore promoting the collapsing of the rows of discrete confectionery pieces. As compared to a chocolate bar, the invention provides already portioned pieces that can be more easily, hygienically and friendly shared with a higher acceptability as handling with the chocolate can be avoided. The zipper, when provided, can re-close the package member if still chocolate pieces remain in the bag. The zipper may be combined to another opening means that eases the opening of the package member the first time such as a tear cut, a tape or perforation located further outside along the safety seam 27 with respect to the zipper.

Fig. 7 to 9 illustrate another variant of the invention in which the package member is a conventional flow wrap package member formed by a tubular web 4 enveloping a substantially layer of individual chocolate pieces, arranged in a matrix as previously explained, with a longitudinal seam 40 which extends approximately centrally on one of the two large web surfaces 20, 21 of the package member. On each end of the package member is provided a transverse sealing seam 41, 42 sealed in a known manner in the packaging technology. The flow wrap package member is usually formed by feeding film through a horizontal folding box device, forming the film using a former around the product and sealing a longitudinal seal.

On one longitudinal folded side 47 of the package member which corresponds to opening side of the package member is provided a tear tape 48 that enables the opening of the package member. The tear tape is produced by adhesively connecting or sealing the tape onto the interior surface of the film before wrapping as known in the art. The folding sides of the package member may further be provided with gussets 49, advantageously formed during the wrapping operation that confers a wider passage after opening by the tear tape thereby promoting access to the confectionery items for an easy nibbling.

In an equivalent manner, the tear tape may be replaced by a tear open aid under the form of a slit oriented in the longitudinal direction. The "longitudinal" direction means the direction of the package member orthogonal to the end seams 41, 42. This direction also corresponds to the direction orthogonal to the conveying direction of the film in the wrapping machine. The tear-open slit may be a simple cut,

effected by a blade assembly, with or without removal of material. The seal does not penetrate far across the width of the seal so as to ensure that the hermetic seal of the package member is not endangered. The tear-open slit aids in initiating the tearing of the end of the package member such that the user may with ease produce a tear which  
5 extends longitudinally across the opening portion and results in a full severance of an end portion of the package member where the sealing seam and the tear-open slit are provided, thus, transforming the compact substantially flat package member in a sachet which can be handled with the opening upwardly wide open for convenient nibbling of the pieces of chocolate. Preferably, the tear-open slit is combined with a  
10 plastic film such as a polypropylene film that is axially oriented to provide a privileged opening in the direction of the slit while resisting to tearing in the orthogonal direction to the slit.

The opening means may also be a laser perforation forming a weakening line along the opening portion. The film is usually a laminate of plastic layers and the  
15 perforation is carried out through a partial thickness of the laminate leaving the rest of the laminate's thickness intact.

The flow wrap package member 2 may be formed from a flexible plastic mono-layer or laminate. The thickness of the film has preferably a thickness of from 20 to 60 microns, even preferably, of from 30 to 40 microns. The thickness of the  
20 film also depends on the number of layers wrapped in order to prevent deformation of the package member as the thickness of the confectionery product increases with two or more layers. For a single layer, the thickness may preferably be of about 30 microns whereas for two superimposed layers, it is preferable to have a film of a thickness of about 40 microns to provide more rigidity to the packaging surrounding  
25 the product.

Figs. 11 to 14 illustrate a possible method for packing the chocolate pieces in the organized matrix configuration within a flow wrap package member of the type described in Figs. 1 to 6. It must be noted that this method, even if preferred, may not be the only one and that other methods may also be contemplated for an equivalent  
30 result.

The principle of the method of Figs. 11 to 14 consists in packing the chocolate pieces in an organized way without scuffing the individual pieces. For that, a solid scored block 60 of product is firstly tightly wrapped and subsequently broken up in the wrap to form the individual chocolate pieces using suitable breaking-up means.

5            Fig. 11 shows a packaging line where individual molded blocks 60 of chocolate are horizontally fed from a conveyor belt 70 to a wrapping unit 8. The molded blocks are parallelepipedal blocks scored with crossed grooves 61 forming imprints corresponding to the desired contour of the chocolate pieces. The grooves must resist to demolding from the molding unit but should be relatively easy to break  
10 in the breaking unit while not forming too many small fragments or marks on the chocolate surface. The grooves are also intended to form the clearance. For that, the grooves are normally provided with a depth of the order of about 15 to 30% of the thickness of the block. As a matter of example, the thickness of the block may be of 11 mm and the grooves may have a depth of about 2.5 mm.

15            The feeding conveyor belt 70 could also be replaced by a robotic device that lift the blocks from the molding unit to place them on to the wrapping unit. However, this solution may not be suitable for high throughput operations and may be more expensive and require more maintenance than usual conveyor feeding.

              The block of chocolate 60 is enveloped in the wrapping unit horizontally;  
20 more specifically, by application of the block flat onto a first half 83 of the packaging web and by folding a second half 82 of the packaging web on top of the block using a suitable directional driving roller assembly. The wrapping unit can be a standard equipment such as an horizontal flow pack machine of reference "SIG-HSF" commercialized by S.I.G Schweizerische Industrie-Gesellschaft. In such a wrapping  
25 assembly, a heat sealable continuous, plastic film 81 is pulled from a plastic film supply roll 72 located from beneath of the entry of a second conveyor belt 71 by a drive and pinch roll pair 74 and optionally a directional roller 75 so as to apply flat on the second conveyor belt 71 a first half 83 of the film. The second half 82 of the packaging film is forced to fold upon the block of chocolate by means of a folding  
30 means such as a bracket 76 that restricts the vertical passage of the film along the conveyor and envelops over the top side of the scored blocks of chocolate. A longitudinal resistant heat seal is carried out by a roller 77 positioned on the side of



the two superimposed free end of the folded film. When heat sealing is carried out, the roller may include integrated heater elements of sufficient resistive power to fuse the two ends of the film and cause them to bond together. The position of the seal may determine the tension applied to the package member. The seal is preferably carried  
5 out as close as possible to the side of the block with a safety margin necessary not to damage the chocolate by the fusion or sealing pressure.

Alternatively, the sealing may be done by cold sealing of a latex seam or similar self-sealable material. In this case, pressure of a pressure means is only sufficient for sealing, thus, allowing to run the wrapping line at a higher speed. The  
10 dimension and tension of the package member must be predetermined by placing the self-sealable cord at the right location along and across the internal surface of the web to form the seams.

As illustrated in Fig. 11 also, an integrated opening system such as a tear tape or a plastic zipper may optionally be provided along the longitudinal seam. For  
15 example, a zipper or tape strip 79 is pulled from a heat sealable zipper or tape strip supply roll 80 and is inserted between the two webs in the seam area before longitudinal sealing. The sealing of the longitudinal seam causes the zipper or tape strip to bond to the internal surfaces of the webs and to be retained in suitable position to form the easy opening system. The zipper or tape strip may be cut individually by a  
20 cutting system at the correct length just before sealing by an independent cutting assembly (not shown) or alternatively cut at the length of the package member by the same cutting tools used to later separate the packages. Further ahead on the wrapping line is provided a pair of platens or jaws 78, 79 that reciprocate in abutting relationship at regular intervals corresponding to the distance between two adjacent  
25 packaged blocks on the line. The platens form the transverse sealing seams of the package member and may be combined to a cutting tool to separate the packages along the middle of the seal. The platens or jaws may include heaters for making a heat sealing or have no heaters when cold sealing is considered. The cutting tool may also be provided separately shortly after the sealing station. The platens could also be  
30 replaced by rotary jaws as known in the art.

A block 60 wrapped in its flow wrap package member is illustrated in Fig. 15 as a matter of example. After the sealed packages are separated by cutting, the

packages are individually passed through a breaking station 9 that operates the portioning of the block into the several pieces of chocolate according to the scored pattern envisaged. The in-pack breaking of the chocolate block may encompass various embodiments. One of the simplest way is to use contoured rollers that apply a breaking effort onto the block and/or force the block to follow an arcuate conveying path while the block travels along the conveyor means.

Fig. 12 shows the breaking along the grooves of the block oriented transversally to the conveying direction "A". There may be various ways to sever the block. A relatively small-diameter roller 90 is used that forces the block to travel a downward radius "R" of curvature that is short enough to sever the block along its transverse grooves 61. The roller may be positioned in the vicinity of two conveyor means, positioned relative to the other at a different height, so as to aid in breaking the block as the block can further bend downward. There may be other solutions such as breaking the block between two conveyor belts, for instance (not shown).

Fig. 14 shows the breaking along the grooves 61b of the block oriented parallel to the conveying direction. A single roller 91 of large diameter may be used with various stepped portions 92, 93, 94, 95 that promote the bending of the rows of chocolate and their separation. They may also be complementary stepped portions 96, 97, 98, 99 on the surface of the belt to help the deformation of the block and prevent the blocks from being crushed. The roller 91 could also be divided in separate longitudinally spaced apart rollers, each arranged to break one single groove between two rows of chocolates. The rollers are preferably made of relatively soft material such as rubber or a polymeric foam to prevent damages and scuffing of the chocolate.

The rollers 90, 91 can be driven to successfully break the blocks in separate chocolate pieces at a speed up to about 400 packs per minute. The operational conditions and parameters such as the temperature of the block, humidity, dimensioning of the grooves, speed, geometry of the breaking means, etc. can be adjusted by the skilled artisan to optimize the breaking process and output while reducing the production of chocolate debris and crooked edges.

A wide range of modifications may be contemplated in the wrapping unit according to the type of flow wrap package member desired. For example, the flow

wrap package, as apparent on Fig. 7 to 9, is produced in a conventional horizontal flow wrap machine with a supply roll of film pulled from above the conveyor line and sealing of a longitudinal seam below the tubular sleeve that is produced. A suitable machine for such a packaging may be a flow wrap machine of "HBM" type from  
5 S.I.G.

In a further variant of the invention, the confectionery product could also be wrapped by the flow wrap package member as individual separate confectionery pieces. For that, the confectionery items may be molded as separate items, which are of the same or different composition, or, alternatively, molded as a block and  
10 subsequently broken before wrapping. Even when in a block or otherwise, the different rows of pieces can be of different compositions. In a block, The confectionery items may be arranged in matrix and transported onto the wrapping film by different means such as by a robotic device that moves the pieces in-group while retaining the matrix pattern until placing on the film and wrapping are achieved.

15 In other possible variants as illustrated in Figs. 16 and 17, the confectionery pieces may have various sections such as rounded or triangular shapes that also provide a flared gap between two adjacent pieces. Furthermore, the clearance may not necessarily be a flared gap but may be a constant gap with distant but parallel portions as illustrated in Fig. 18.

20 The invention is not limited to the embodiments hereinbefore described which may be varied in construction and detail. For instance, the package member may be a four-side seal flow pack as well.